

Minerals and Geology

Minerals are fundamental to the nation's well being. The National Forest System, by coincidence of geology and geography, is a principal storehouse of mineral and energy resources. The production of minerals and energy resources are statutorily authorized uses of the National Forest system except for those lands formally withdrawn from mineral activities by Act of Congress or by Executive authority. Mineral activities on the Bighorn National Forest are encouraged in accordance with the National Mining and Mineral Policy Act, the Acts governing mineral disposals from National Forest System lands and the various applicable Federal and State statutes governing protection of the environment, including air and water quality.

The Forest Service objective is to manage minerals related activities in a timely manner, consistent with multiple use management principles, and to integrate the exploration, development, and production of mineral and energy resources with the use, conservation, and protection of other resources.

Statutory and regulatory direction separate mineral resources in lands owned by the United States into three categories: locatable, leasable, and salable. These are discussed below.

There is no known way to accurately anticipate when or where specific activities will take place on National Forest System lands involving most minerals activities, including oil and gas leasing, exploration or development. Individuals, corporations, and others that make up the oil and gas industry, initiate oil and gas activity through an application process. Anticipation, in a general way, of possible activity is provided through a mineral potential evaluation that was conducted to determine the possible existence of locatable and leasable mineral deposits on the National Forest System lands.

Mineral potentials have been determined for metallic and nonmetallic minerals, and energy fuels (see project file). A set of general criteria was established which included known favorable geology and structure, known mineral occurrences and reserves (if data was available), and field activity related to mineral exploration, development, and production. The "potential levels" determined as High, Medium, Low, No and Unknown are based on today's knowledge and prices and may change at any time, depending on the mineral economy, technological advances, or further exploration. "High" mineral potential includes favorable geology and structure, known economically valuable mineral occurrences and reserves (if data is available), and field activity. "Medium" mineral potential includes favorable geology and structure, known mineral occurrences with insufficient evidence of present economic value, or sub-economic deposits, and occasional activity. "Low" potential includes geology considered unfavorable at this time, no known mineral occurrences, explored or prospected sites determined non-economic, and little or no present activity, but does not infer the lack of mineral deposits. The "No" potential level indicates that the nature of the geologic environment is not favorable for the leasable commodity type indicated, non-known resources and sporadic field work. The "Unknown" potential level includes all areas where the geology masks

the terrain limiting the ability to readily obtain information but the geologic environment could be favorable, no known resources or basic exploratory work.

The areas of known reserves and producing sites must be administered knowing that surface resource management programs will require close coordination with the mineral activity. Forest administration will involve access, related special use permits, reclamation, etc.

In “High” and “Medium” potential areas, any stage of exploration, production or development can be expected to occur during the first 10 years of the plan’s application.

In “Low” potential areas, the probabilities are that any mineral activities during the first 10 years of the plan will be limited to prospecting and exploration. Even if a valuable deposit is discovered, particularly a major one, it is unlikely that the necessary permits and approvals can be acquired to put it into production within the next 10-year period.

In the “No” potential areas, activities generally will be very limited for at least the first 10 years of the plan.

Activities within the “Unknown” potential areas will probably occur during the lifetime of the plan because of the unknown aspect. Should a valuable deposit be discovered, the time frame required for permits and approval, and to implement production plans would require a minimum of 10 years. Thus activities during the first 10 year period will be very limited.

Advances in exploration or production technology may result in greater activity levels in all areas, regardless of the current potential rating.

All National Forest lands open to entry could be explored and developed depending on market conditions. Currently, an average of 14 operating plans per year are submitted to the Forest Supervisor’s Office.

The Mineral Potential Report for the Bighorn National Forest is the source document for much of the discussion in the following sections.

LOCATABLE MINERALS

Locatable minerals are those valuable deposits subject to exploration and development under the U.S. General Mining Law of 1872 and its amendments. Commonly, locatable minerals are referred to as “hardrock” minerals. Examples include, but are not limited to, deposits of iron, gold, silver, lead, zinc, copper, and molybdenum. Citizens, and those who have declared their intent to become citizens, have the statutory right to explore for, claim, and mine mineral deposits in Federally owned lands subject to the U.S. Mining Laws, including those of the National Forest System. Through a Memorandum of Understanding with the Bureau of Land Management (BLM), U.S. Department of the Interior, the Forest Service administers most aspects of operations of U.S. Mining Laws on National Forest System Lands. In addition, under the regulations

in 36 CFR 228, the Forest Service approves exploration and mining operating plans and ensures compliance with State laws and administers those operations to ensure protection and reclamation of affected surface resources.

Current Use and Management

There is an active operation producing bentonite for medicinal purposes on the west side of the Bighorns, a few miles northwest of Meadowlark Lake. There are several other bentonite claims about one mile west of that operation. Starch (1981) indicates that are bentonite reserves of 45 to 54 million tons on the west flank of the Bighorn Mountains.

Several mining districts, established principally for gold, existed in the area of the Bighorn national Forest around the turn of the twentieth century. These included Bald Mountain, Walker Mountain, Willett Creek, East Goose Creek, Kelly Creek, and Bull Camp. There was no significant production from any of these districts. Placer activities also took place during the 1860's in the North Fork of the Crazy Woman Creek area. Some exploration for gold may be sporadically occurring in the Bald Mountain area. The other mining districts are currently dormant.

There is a deposit of niobium (columbium) and tantalum, rare earth elements, in the Cookstove Basin area. At present the economic value is unknown.

Some copper has been found in the Walker Mine located about two miles southwest of Walker Mountain, and a copper prospect has been reported north of Powder River Pass in the southern Bighorn Mountains.

A U.S. Bureau of Mines study (Osterwald et al. 1966) indicates a monazite deposit with 8.8 percent thorium near Bald Mountain. Ilmenite, zircon, and magnetite were also found. Currently, there is no exploration for or development of these minerals on the forest.

Within the Cloud Peak Wilderness, most of the mineral activity has been in the north half along Edelman, Goose, and Medicine Lodge Creeks, and on the Edelman Creek Fault and associated faults south of Coffeen Park. Mining activity consisted of placer and underground exploration for precious and base metals. There is no mining activity in the Cloud Peak area today.

Some platinum and copper deposits have been found in the Cloud Peak Wilderness but not in sufficient quantity or quality to be mined. There is no information to indicate concentrations of base or precious metals in the former RAREII roadless areas adjacent to the wilderness.

Small, high-grade uranium deposits are found in the Little Mountain area, approximately 12 miles west of Cookstove Basin off the National Forest. Most deposits are 500 tons in size and may contain only a few tons or pounds of ore (Osterwald et al. 1966). Similar deposits may exist on the northern end of the forest.

The Mississippian Madison limestone is a potential source of high-calcium limestone for chemical and metallurgical uses. The limestone is located along both flanks of the forest and across the extreme northern half. A quarry operation was proposed several years ago one mile west of Story, Wyoming.

Gypsum deposits occur along the flanks of the Bighorns. They are not being explored or mined at this time. Uneconomic deposits of nickel, talc, manganese, and asbestos have been described within the forest boundary.

Demand Trends

Exploration, development, and production of locatable minerals will continue to be dependent on market prices. With increased prices, more activity will probably be directed toward locatable minerals, especially base and precious metals. Areas containing known reserves will experience continued development and production. Exploration will search for additional reserves adjacent to, or further delineate, a known mineral deposit.

With improved mining technology and a better mineral market, the demand for bentonite, calcium, uranium, and some rare earth elements may prompt development and production of these minerals on the Forest.

LEASABLE MINERALS

Federally owned leasable minerals include fossil fuels (coal, oil, gas, oil shale, etc.), geothermal resources, potassium, sodium, carbon dioxide and phosphates. These minerals are subject to exploration and development under leases, permits or licenses granted by the Secretary of the Interior. The controlling statutes currently are the Mineral Lands Leasing Act of 1920 and amendments, the Mineral Leasing Act for Acquired Lands of 1947, and the Geothermal Steam Act of 1970, whichever applies to the particular resource.

Current Use and Management

There are currently ### oil and gas leases totaling about ### acres of the Forest. A well was being drilled during the early part of 1984 through the Piney Creek Thrust west of Story, Wyoming. This well has since been completed and abandoned. Seismographic activity has and is being continued along the eastern flank of the Bighorn Mountains from Story south to Buffalo. This activity is based upon the theory that there is additional over thrusting of the granites over the sedimentary formations. A well site is being considered west of Buffalo, Wyoming.

Gries (1983) noted that there are several areas in the Rocky Mountains where sedimentary rocks are concealed beneath mountain-front thrusts, including the eastern flank of the Bighorn Mountains. The amount of over thrust is unknown but may only be several miles, limiting exploration to the eastern edge of the Forest (Demarest 1941). The nearest production is about 30 miles to the southeast in the Powder River Basin.

To the west of the forest, potential geologic formations include the lower Cretaceous and Permian-Pennsylvanian reservoirs. The nearest oil field is about 15 miles to the west of the Forest (Ver Ploeg et al. 1980)

Demand Trends

Oil and gas activity will continue to be conducted along the eastern edge of the Bighorn Mountains for hydrocarbon traps under the over thrust granite rocks. This activity will cease only when the industry has found the anticipated oil and gas reservoirs or feels the structural complexity of the area is understood and determined that there are no reservoirs present.

SALABLE MINERALS

Salable mineral materials, or common varieties, are generally low value deposits of sand, clay, and stone that are used for building materials and road surfacing. Disposal (mining) of these materials from the National Forest System is totally at the discretion of and by the Forest Service. Requirements controlling salable mineral material operations are similar to those for leasable minerals.

Current Use and Management

Surface sources of sand and gravel are available on the Forest. They include alluvial, terrace, pediment, and glacial materials. These common varieties include granite, dolomite, limestone, and sandstone.

“Leopard rock” is a local term for an ornamental building stone found north of U.S. Highway 14 just inside the forest boundary. There is an on-going local demand for this rock.

Moss agates are found between Spanish Point and Mill Creek adjacent to the Forest. The deposit does not appear to extend on the Forest.

Demand Trends

An increase in demand of common variety minerals may be expected as road construction and maintenance occurs on the forest. Since there are ample reserves of these minerals on private lands, demand for minerals for off-forest uses are not expected to be significant.